

### Claims

1. A composition for the anodizing treatment of a magnesium alloy, characterized in that it consists of an aqueous solution, containing a niobium salt and hydrofluoric acid, the pH of which solution is maintained at a value between 7 and 10.

2. The composition as claimed in claim 1, characterized in that the niobium salt is chosen from oxides and fluorides.

3. The composition as claimed in claim 1, characterized in that the niobium salt is niobium pentoxide.

4. The composition as claimed in claim 1, characterized in that it contains a zirconium salt.

5. The composition as claimed in claim 4, characterized in that the zirconium salt is chosen from oxides and fluorides.

6. The composition as claimed in claim 4, characterized in that the zirconium salt is  $ZrF_4$ .

7. The composition as claimed in claim 1, characterized in that the pH is between 8 and 9.5.

8. The composition as claimed in claim 1, characterized in that it contains phosphoric acid and/or boric acid.

9. The composition as claimed in claim 3, characterized in that it is supersaturated with niobium pentoxide.

10. The composition as claimed in claim 1, characterized in that it furthermore contains  $NH_4OH$  or an amine for correcting the pH.

11. The composition as claimed in claim 1, characterized in that it contains:

- from 0.01 to 0.04 mol/l of niobium pentoxide;
- from 20 to 50 ml/l of hydrofluoric acid;
- up to 0.04 mol/l of zirconium fluoride;
- from 50 to 70 g/l of  $H_3PO_4$ ;
- from 30 to 70 g/l of  $H_3BO_4$ ; and
- the required amount of a 28% aqueous ammonia solution for adjusting the pH to a value between 7 and 10.

12. A method of treating a magnesium alloy, consisting in making said alloy undergo electrolysis in an electrochemical cell in which said alloy functions as anode(+), characterized in that:

5       - the electrochemical cell contains, as electrolyte, a composition according to the invention at a temperature between 20°C and 40°C; and

      - an initial voltage sufficient to create a current density between 1.5 and 2.5 A/dm<sup>2</sup>, is applied to the cell and  
10 then the voltage is progressively increased up to a value between 240 and 330 V in order to maintain the initial current density.

13. The method as claimed in claim 12, characterized in that a DC source connected in series to an AC source is used  
15 as power supply for the electrochemical cell so that the  $I_{AC}/I_{DC}$  ratio is about 0.15 to 0.30.

14. The method as claimed in claim 12, characterized in that the duration of the electrolysis is from 5 to 30 minutes.

20       15. The method as claimed in claim 12, characterized in that, during a preliminary step, the alloy part to be treated is subjected to a surface cleaning operation.

16. The method as claimed in claim 15, characterized in that the cleaning is a mechanical cleaning operation using  
25 abrasive disks, followed by a degreasing operation in a hot phosphate/carbonate solution, and by a pickling operation in a dilute phosphoric acid/hydrofluoric acid solution, or a degreasing operation followed by a pickling operation.

17. The method as claimed in claim 12, characterized in  
30 that the electrolysis is followed by a plugging treatment.

18. The method as claimed in claim 17, characterized in that the plugging treatment consists of an alternation of steps in which the part is immersed in a bath and then left in air, these steps being followed by annealing at 75° -  
35 150°C in oxygen for a few hours.

19. The method as claimed in claim 18, characterized in that the plugging is carried out using an aqueous acid solution containing niobium pentoxide, cerium nitrate and

zirconyl nitrate, or a hot aqueous  $\text{Na}_2\text{SiO}_3$  solution, or an epoxy/polyamide varnish or an epoxy/amine paint.